

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 10/023,258  
Applicant : Zhang et al.  
Filed : December 14, 2001  
TC/A.U. : 1621  
Examiner : J. Parsa  
Docket No. : 1856-23900 (9602.0-01)  
Customer No.: 31889

Confirmation No. 5940

AFFIDAVIT OF RAFAEL ESPINOZA, Ph.D.

Atty. Dkt. No.: 1856-23900  
Date: November 7, 2003

Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450  
Sir:

PURPOSE OF DECLARATION

This declaration is made as evidence of the patentability of the method for producing hydrocarbons from syngas in a three-phase system that is claimed in the above-identified application.

STATEMENT OF FACTS

1. I, Rafael Espinoza, Ph.D., state as follows:
2. I am over 18 years of age and competent to make this Affidavit;
3. I am a research scientist employed by ConocoPhillips Inc. in Ponca City, Oklahoma and am Director of Fischer-Tropsch at ConocoPhillips;
4. I earned my Ph.D. in Chemical Engineering from Potchefstroomse Universiteit in Potchefstroom, South Africa;
5. I have practiced in the field of gas processing for over twenty years and I am an expert in the field of gas-to-liquids technology and Fischer-Tropsch reactions;
6. I am a named inventor in the above-identified pending patent application;
7. The attached Table indicating productivities (gHC/kgcat/hr) is an accurate hypothetical calculation;

8. Despite substantial, comprehensive experience in this field, until I and my co-inventors made the present discovery, I did not know or suspect that high gas velocities could result in advantageous operating parameters in certain circumstances;
9. Based on my knowledge of the state of the art, the claimed invention, which includes operating a reactor such that the gas Peclet number is less than 0.175 is not obvious;
12. Prior to this invention previous efforts to optimize three-phase reactor systems focused on maintaining plug flow in the liquid phase;
14. Further Affiant sayeth not.

#### TIME OF PRESENTATION OF THE DECLARATION

This declaration is made for submission with the response to the Office Action Dated July 8, 2003, and is for the purpose of overcoming a ground of rejection or requirement made in the Office Action.

#### DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

#### SIGNATURE

Full name: Rafael Espinoza, Ph.D.

Inventor's signature: 

Date: November 6, 2003

Country of Citizenship: South Africa

Residence Address: 1469 N. Prentice Rd.  
Ponca City  
Oklahoma  
U.S.A. 74604

Hypothetical Productivities (gHC/kgcat/hr)  
For various gas velocities;  
at 215°C, 400 psig; fixed catalyst loading and intrinsic activity

Gas superficial velocity, cm/s	10	15	20	25	30	35	40	45
Liquid superficial velocity, cm/s	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Liquid Peclet number	0.042	0.033	0.028	0.026	0.024	0.022	0.021	0.020
Gas Peclet number	0.31	0.19	0.15	0.11	0.09	0.07	0.06	0.05
Productivity, gHC/kgcat/hr	210	301	354	377	386	389	391	392